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EDITORIAL

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Five years of *Heritage Science*: from aborigine cave paintings to the Domesday book and Bayeux tapestry and to Dorothy's ruby red slippers via van Gogh's colours, Magritte's missing quarters, and Qing calligraphy, with the sights, sounds, smells and taste of the past

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Some 6 years ago we published a collection of articles about *Heritage Science*, in our parent journal *Chemistry Central Journal* [1] together with a meeting proceedings primary related to heritage studies [2]. These 20 or so papers initiated a proposal for a new journal in the growing area of *Heritage Science*.

A particularly identifiable need is for the journal to be Open Access (OA). At the time this mode of publication was relatively new, but has now become very fast growing. As an example, the journal *PLOS One* published over 31,000 articles in 2013 and *Scientific Reports* over 25,000 in 2017. The biggest expansion has been in biology. Within cultural studies, OA has been slower to take off but has huge potential. Many smaller museums, conservation institutes, and even less affluent countries and Universities, cannot afford specialist traditional journal subscriptions, especially when the literature is so broad, as authors may publish with very different journals. Many papers in traditional subscription journals are buried within less specialist publications, for example analytical chemistry journals where only a few percentage are

relevant to conservation scientists. So it is hard for less well endowed institutes to get access to the *Heritage Science* literature without OA.

Yet many professional heritage scientists, working at the frontiers, need to justify grants by publishing in high profile journals. Instrumentation for *Heritage Science* has developed especially fast over the past decade, for example spectroscopy to study layers of valuable paintings non-destructively. Sponsors will not pay for this work unless it is widely reported. OA journals provide an excellent avenue, available to institutes freely, as well as to public decision makers, journalists, websites etc., and the Creative Commons copyright license allows additional dissemination so long as the source is acknowledged. The refereeing system ensures that papers have passed through peer review, and many authors are pleased with the improvements suggested throughout the publication process. In other words, the OA system, is very suited for museum and conservation professionals.

Many sponsors now do provide funding for OA publication, and museums recognise the need to spend some of their funds (often from donations or entrance charges) on public dissemination. So although OA publishing has been slower to take off in our field than, for example, in biology, its future is likely to be very bright. With the support of one of the world's largest scientific publishers,

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Springer Nature, who is fully committed to golden OA, by the purchase some while back of BioMed Central (a parent owner of *Heritage Science*), we can be sure of long term archiving and state-of-the-art editorial support for many decades or possibly centuries to come.

From a slow but steady start, *Heritage Science* has developed into an internationally recognised journal in 5 years. We are indexed in Scopus, and our current Citescore puts us 2nd (top 3%) in conservation and 11th in scientific archaeology (top 5%). We are listed in Clarivate Science Citation Index Expanded with an Impact Factor of 1.58, included in the fields of analytical chemistry, spectroscopy and materials science, and also their Arts and Humanities Citation Index. For readers not familiar with these indices, they rank scientific journals according to how widespread they are, measured by citations. For a niche journal in a traditionally conservative area, that has not long been established, this is considered very good, and we have some fantastic articles which will improve our future profile still further.

In addition to the more traditional citation analysis, social media and downloads of papers are relatively high. The effect of OA can be seen for any hybrid OA journal (one that publishes some papers behind a pay wall and others freely available) where statistics are openly available, of course as all our papers are OA, this comparison cannot be directly made. However the greater visibility of OA articles can increase readership by ten fold as judged against hybrid models.

With the sun shining on our journal we continue to publish some fantastic high profile papers, covering a wide variety of frontline studies.

Historically, we start with rock art of 4000 years ago or more in Australia [3], and then move to several studies about ancient Egypt including a study of mummy cartonnage by an amazing consortium coming from 14 different institutes [4]. We move via Greek and Roman times including a remarkable new theory of frescos [5]. The Middle Ages are well represented including recent papers on the Bayeux tapestry whose conservation is highly important, being kept in a specially built museum [6] and the Domesday book [7]. Medieval miniatures especially illustrations in books are well covered—many scribes and illustrators were anonymous posing quite different challenges to later artwork, a good example being the detailed study of a Hebrew manuscript [8].

Moving forward, there has been a huge emphasis on the use of modern instrumental methods to study paintings—are there hidden layers, were there different techniques indicative of several painters and so on. It would be impossible to list all these impressive articles in full, but discuss just a few. Picasso [9] and van Gogh [10] have been the subject of important papers. Mondrian was

studied using chemometric methods [11]. Very impressive, two independent teams reported the third [12] and fourth [13] missing quarters of a painting cut up and covered over by Matisse. A full description of all the papers involving fine arts would involve a who's who of many important Western painters over the past 500 years.

But we have not only reported classical heritage: a recent study involved possibly the only scientific report on conservation of Dorothy's ruby red slippers from the film *Wizard of Oz*, preserved in the Smithsonian as an important part of modern American heritage [14].

And our journal is not restricted to European heritage. We are pleased to be able to publish many papers about the rich heritage of China, for example, from both ancient [15] and more recent [16] times about writing and calligraphy which are very important in Chinese culture. From Japan we have environmental studies, for example of the UNESCO site in Nikko [17] and also several papers about woodblocks, which were artistically important in the 19th century [18]. Islamic culture is not forgotten. There are few studies on paper reported which is an important medium over the centuries [19]. We have recently published a very substantive study of Islamic manuscripts [20]. South America is also on this list, with several primarily archaeometric studies [21].

Our journal has covered all continents apart from Antarctica. A paper about Scott's hut has been suggested, although not yet in the pipeline, but if we do obtain a contribution on this topic we will be fairly unique in heritage journals, covering all continents and a wide range of cultures from Australian aborigine, to Egyptian, Graeco-Roman, Chinese, Japanese, Amerindian, Islamic, Jewish and European.

However we not only report on the sights of the past, but cover other senses. Taste and food is important [22]. Past smells which would have permeated streets, houses and public places are rarely studied to give modern day visitors to museums a sense of the past, and we have published a unique scientific but also sociological work [23]. And last but not least, sound was very important in certain cultures—the area of archaeoacoustics has received little attention so far [24]. Getting a full sensory picture of the past completes a jigsaw which until recently has been primarily visual. Hopefully this journal will continue to encourage a fuller viewpoint.

Less than 10% of the papers published so far in this journal have been cited above and several important themes omitted. However I have tried to convey the tremendous flavour of our publications, broadly covering diverse cultures, geography, and sensory perception. The work has also very much depended on modern instrumentation, some of it, especially in the fine arts, not having been widely available a decade ago. *Heritage Science*

is a very fast developing field, with numerous conferences and research groups, at the frontiers of modern technology.

We have a tremendously active editorial board, most of whom have published several papers, and are leading researchers in the area. They also have co-ordinated several article collections (electronic special issues) which have brought much variety to the journal.

Heritage Science is expanding as a journal with more papers published each year. Citations are also increasing as more people read these articles. As an Open Access publication the endeavours of research are available to all. Various proposals such as Plan S, advocated by major research funders in several European countries [25] may soon require all research funded by most major European research councils to publish in golden open access journals, such as ours (for readers not familiar golden OA means journals that only accept OA papers, rather than hybrid OA journals that accept a portion). There has been a slow but steady increase in recognition of the importance of OA within heritage and conservation studies, and this journal has helped catalyse what we hope will be a sea change in attitudes much to the benefit of the future, opening up museum and conservation institutes to new technology and wider dissemination. The breadth and quality of papers we publish and the expanding authorship base augers well. Support by Springer Nature, one of the top and best established academic publishers internationally, means that there will be a solid basis for archiving and sound editorial practices many decades or more into the future.

Authors' contributions

The author read and approved the final manuscript.

Competing interests

The author declares that they have no competing interests.

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